JPL

Sun Glint

Preliminary Report to the Science Team

July 3rd, 2002

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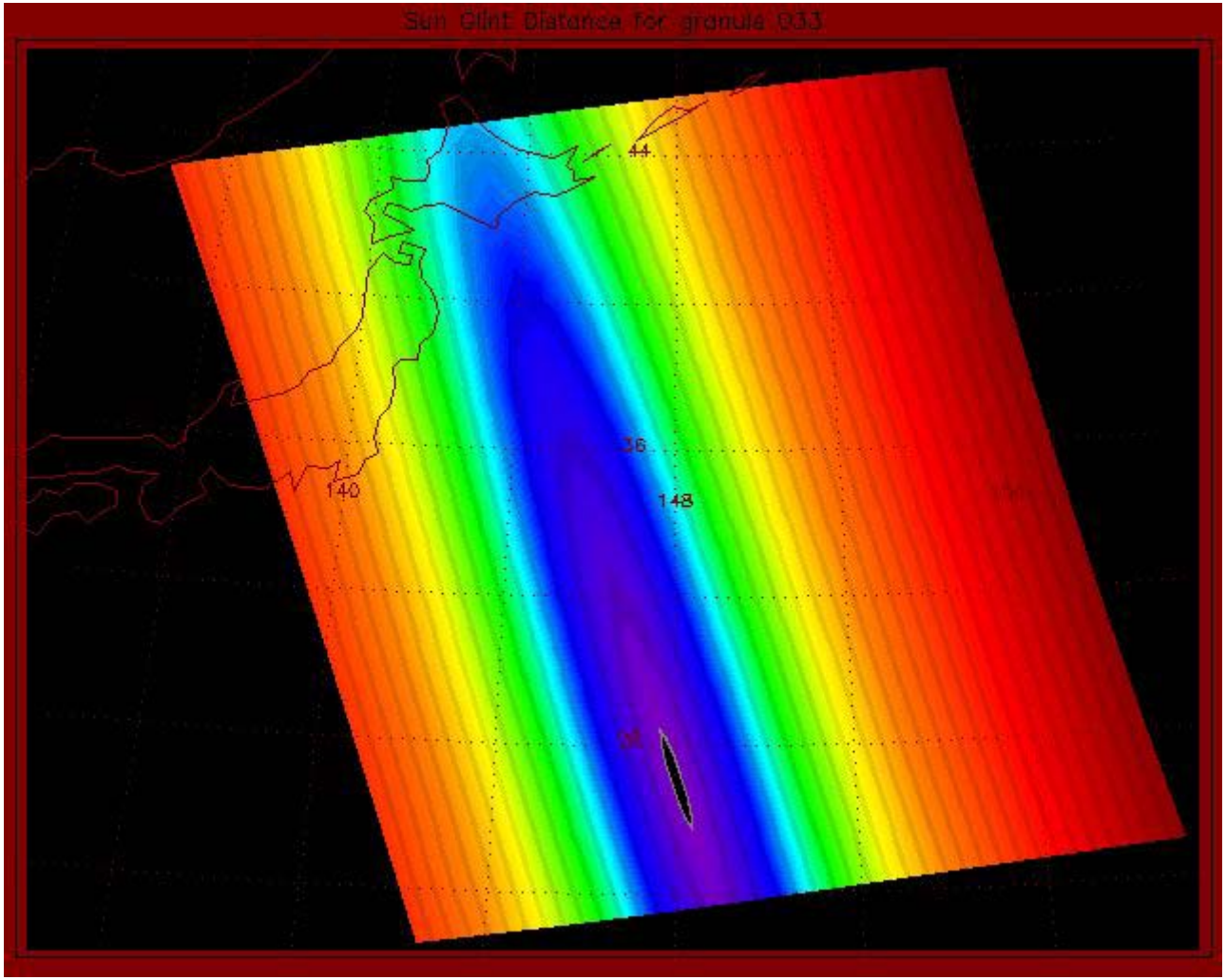
Summary

- Visual inspection of images
  - Need uniform background
  - Small effect will not be noticed
- VIS and shortwave AIRS channels are affected on almost all ocean granules near 30 degree north.
  - Center latitude changes according to season
  - Effect can last up to 10 minutes
    - Sun glint distance < 200km(?)
    - The affected area can be as wide as 400 km
    - Effect can be 60K or larger
  - VIS channels can be saturated
  - Most shortwave IR window channels can be saturated
- AMSU channels 1 through 3 and 15 can be affected
  - Generally undetectable with exceptions (once a day?)
    - Possibly over calm ocean
  - Effect can be detected on 3 x 3 AMSU footprints
  - AMSU-2:up to 15K on the center footprint and 5 - 7K on the rest
  - AMSU-1,3 & 15: up to 5 to 7K

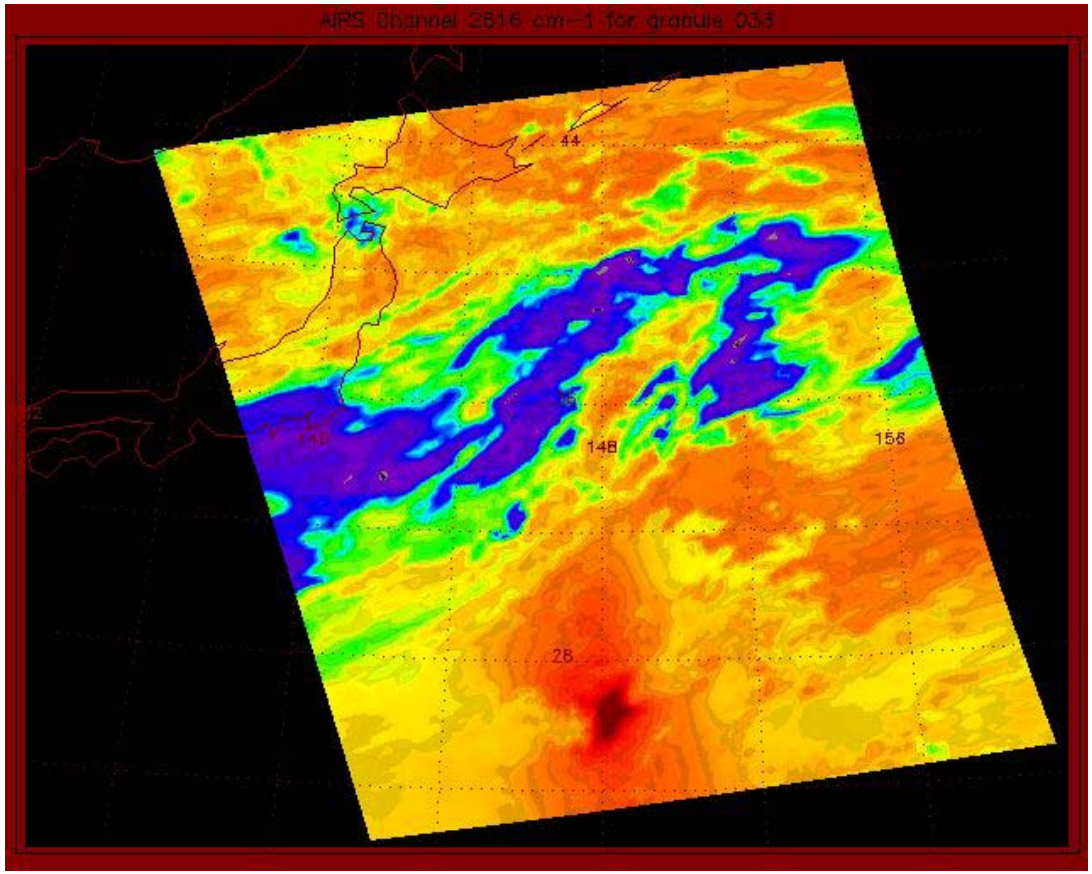
Granule 33 of June 14

- Pacific ocean to the south-east of Japan
- Stormy on the northern half of granule
- Calm ocean to the south with patchy cloud
- 2616 cm-1 channel is not saturated, but many channels in M1a/M1b are saturated.
  - Radiance range were computed assuming Lambertian surface
- Maximum brightness temperature is 370K with SST of 300K(?)

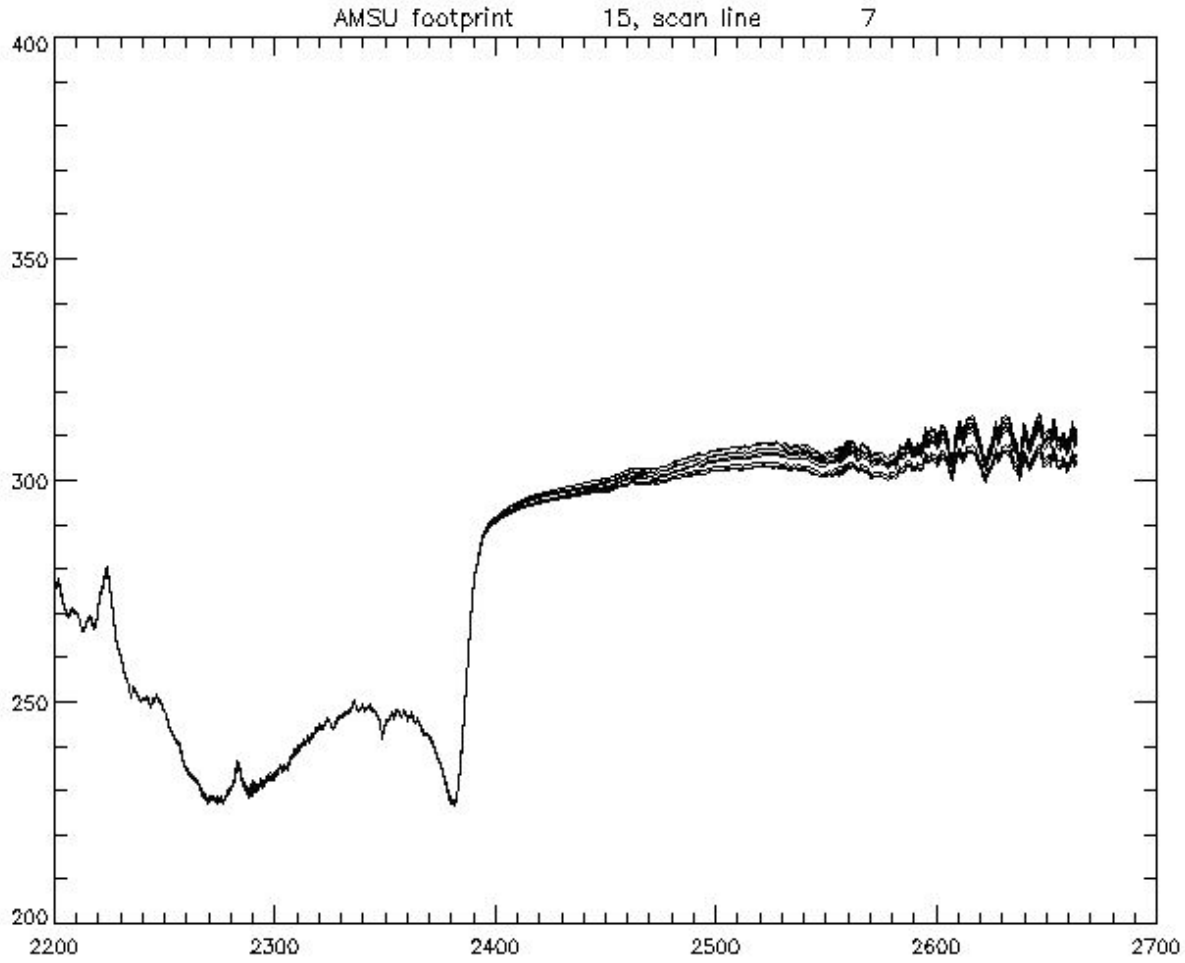
Sun Glint Distance



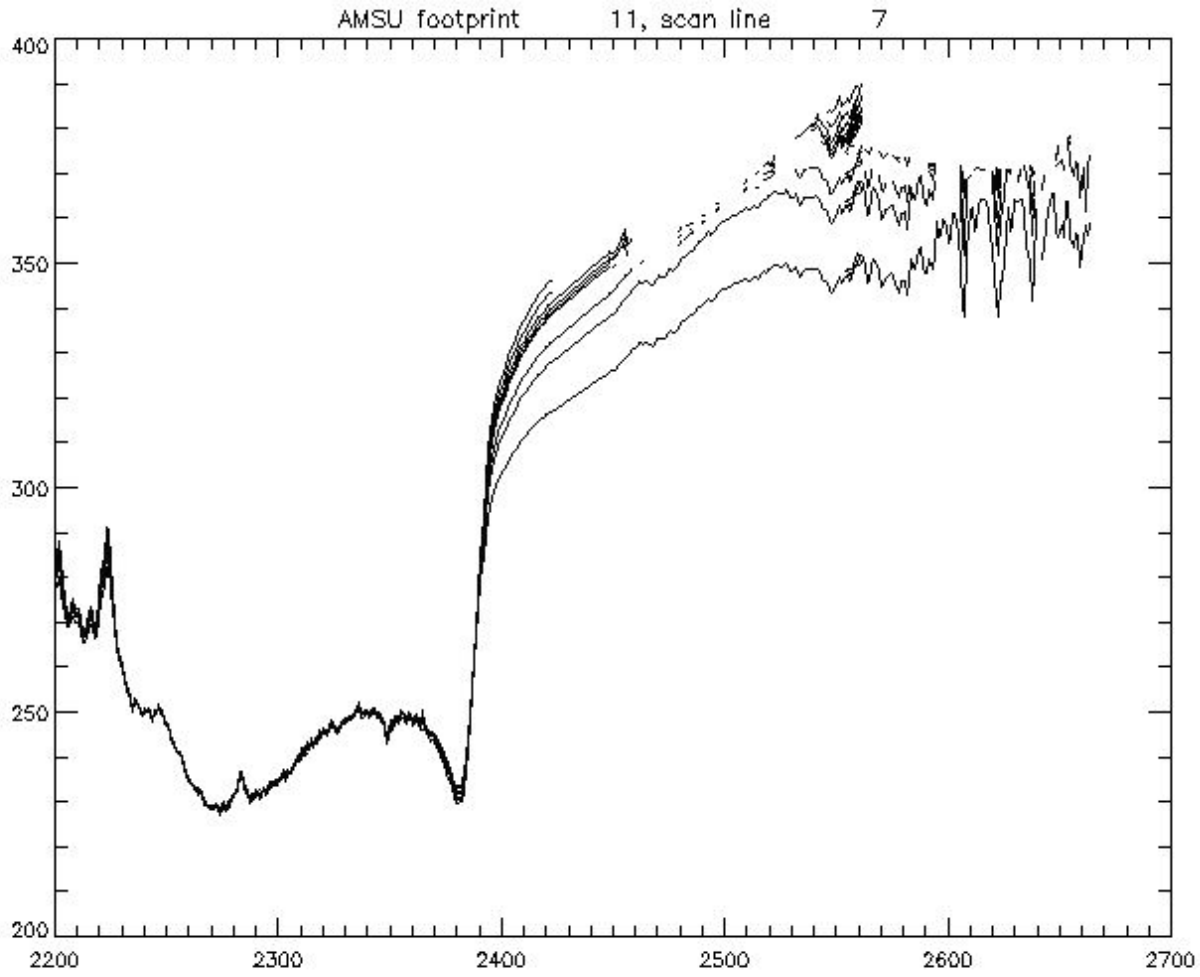
AIRS Shortwave Window Channel



AIRS Spectra without glint



AIRS Spectra with glint



AMSU/HSB channels

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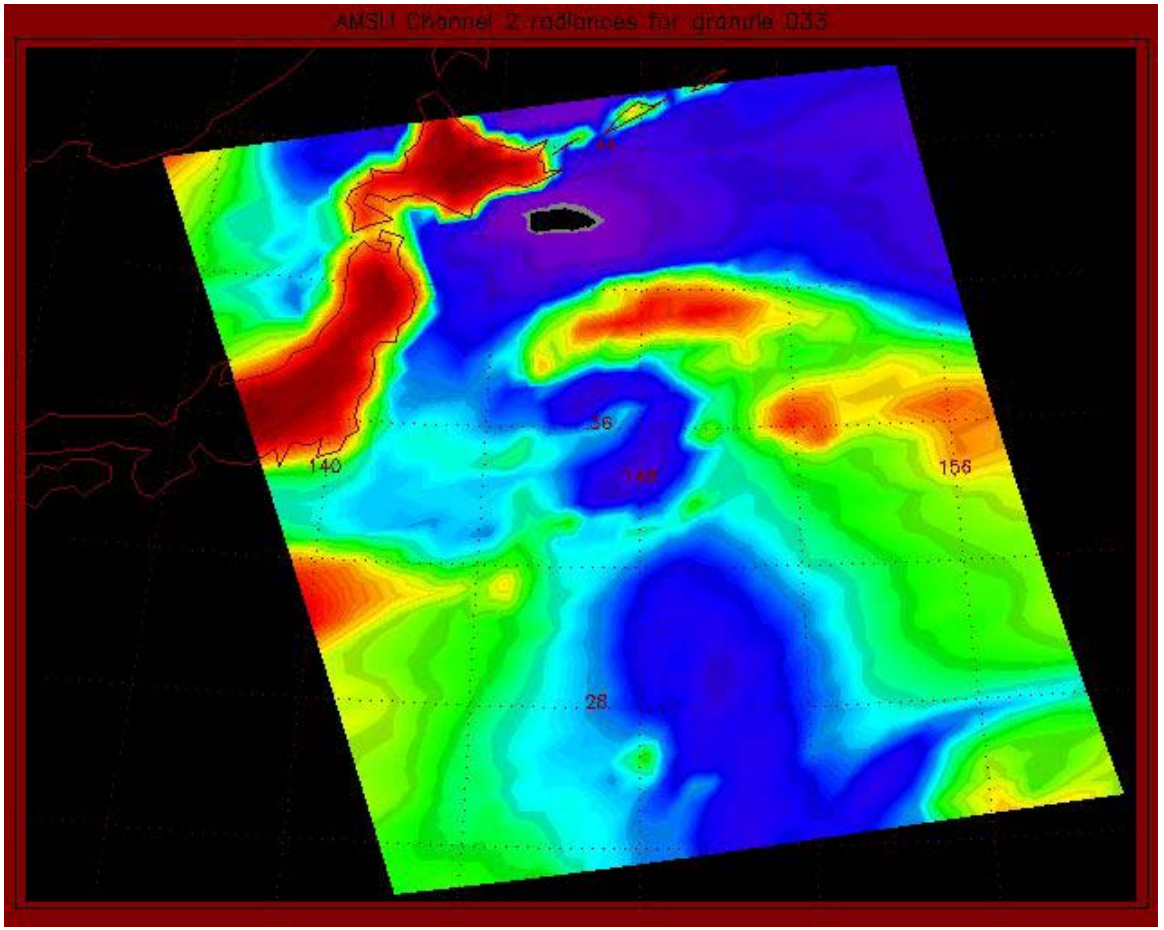
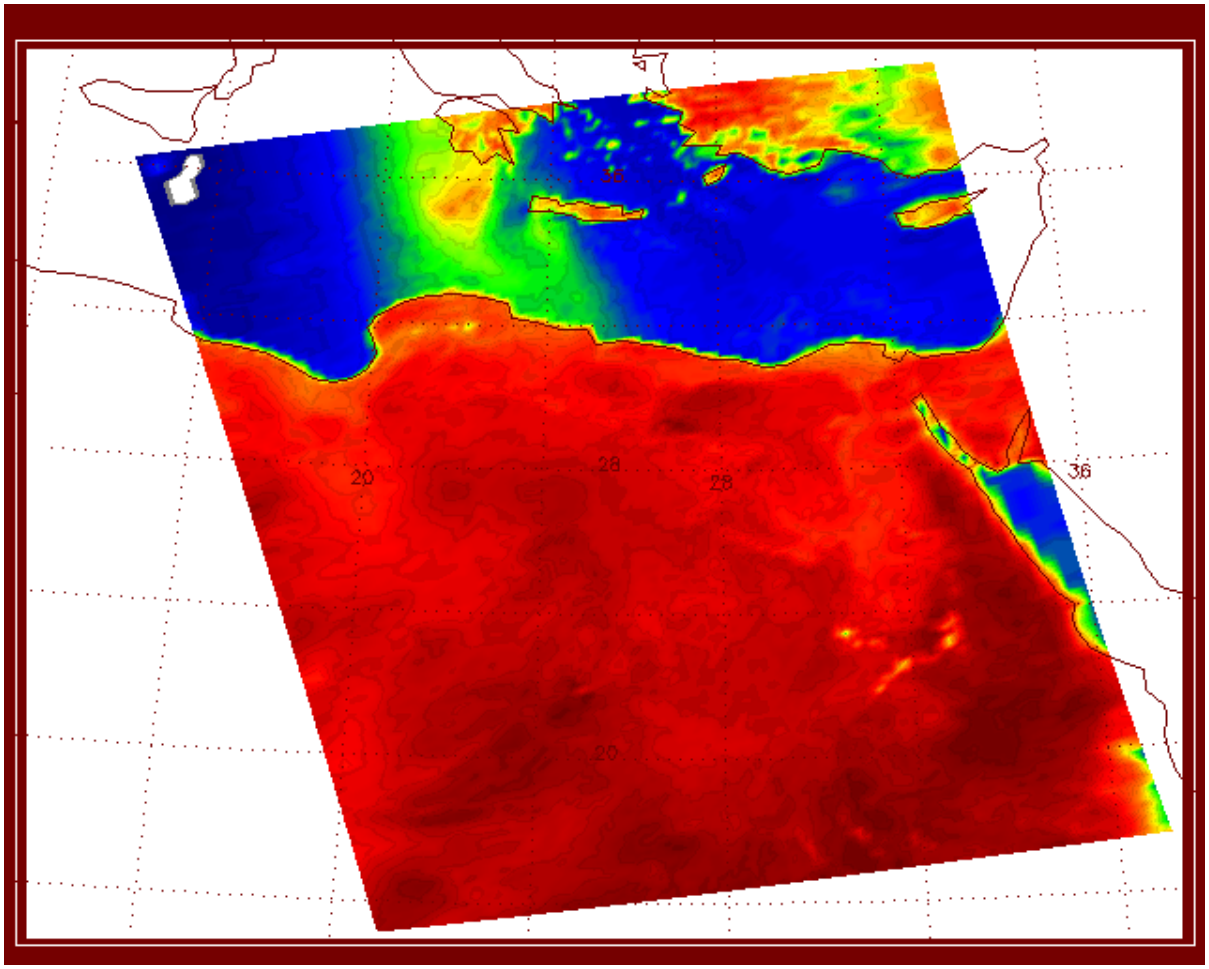
- Sun glint is not detectable on most granules
- Two granules, out of three days, were found to have detectable effect from sun glint
  - Granule 33 of June 14 has larger effect
  - Granule 155 of June 15 has half the effect
- Only AMSU channels 1 to 3 and 15 have detectable effect
  - 3 by 3 AMSU footprints have detectable effect
  - Sun glint distance < 50km(TBD)
  - AMSU channel 2 has the most effect up to ~15K
  - Other channels have up to ~7K

AMSU Channel 2



Granule 115 of June 14



Future Plan

- Use simulation to detect smaller sun glint
  - AMSU/HSB channels
  - Down to 1or 2K (?) over uniform background.
- Magnitude of sun glint
  - Function of surface condition - granule 115 of June 14
- Use of window channels in retrieval
  - Sun glint distance is a good indicator of sun glint
    - Necessary, but not sufficient
  - Unpredictable sun glint effect
  - Forward algorithm assumes Lambertian surface
    - Too little reflected solar radiance when glinting, too much otherwise
- Saturated shortwave channels
  - Under investigation